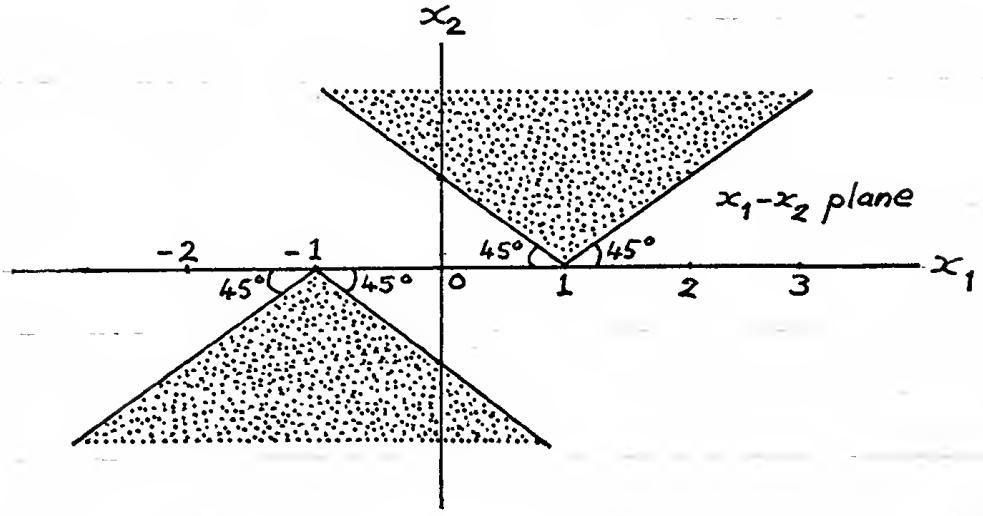
Problem 1

Design a neural network, with two inputs x_1 and x_2 and a single output s, that behaves as a two-class data classifier. On the x_1-x_2 plane, shown below, all input patterns (x_1, x_2) inside the two shaded areas are identified by an output value $s = 1$, whereas all input patterns outside these areas are identified by $s = 0$. How will your network classify the input patterns $(1, 1)$, $(-1, -1)$, and $(1, -1)$? Can the network properly classify the input pattern $(0.5, 0.5)$? Why?



Solution

The neural network consists of four layers : an input layer with two neurons N1 and N2 ; two hidden layers, the first with four neurons N3, N4, N5, and N6, and the second with two neurons N7 and N8 ; and an output layer with a single neuron N9.

The orientations of the four separation